

# Quantitative Analysis of Projected Emissions from Proposed Miami-Dade County Trash Incinerator

An Evaluation of Miami-Dade County's Claims that a New  
4,000 Ton/Day Mass Burn Incinerator will Result in  
No Unacceptable Pollution Impacts

January 24, 2025



Palm Beach Renewable Energy Facility 2 (REF 2) Trash Incinerator  
in West Palm Beach, Florida

**Commissioned by The Goldstein Environmental Law Firm, P.A.,  
on behalf of the City of Miramar, Florida**

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## SUMMARY

From December 1981 until February 12, 2023, Miami-Dade County relied on burning much of its municipal solid waste (MSW) at the trash incinerator known as the Miami-Dade County Resource Recovery Facility or “Covanta Dade” in the City of Doral. The incinerator was owned by the county but privately operated by Covanta (now renamed “Reworld” as of April 2024).

On February 12, 2023, a fire broke out and burned for three weeks, causing the permanent closure of the incinerator. Such fires are increasingly common. Two other trash incinerators operated by Covanta had waste pile fires that burned for as long as two weeks in Montgomery County, Maryland and Fairfax County, Virginia in late 2016 and early 2017, respectively. Many smaller fires at incinerators have required an off-site emergency response and these fires are thought to be increasing due to the prevalence of lithium-ion batteries in the waste stream.

Miami-Dade County is planning to build a new incinerator capable of burning 4,000 tons/day, which would be the largest in the U.S. and one of the largest in the world. Currently, the largest incinerator in the U.S. burns up to 3,500 tons/day.

Miami-Dade County claims new incinerators are clean and safe. The newest trash incinerator built in the U.S., which came online in July 2015, is Palm Beach Renewable Energy Facility 2 built adjacent to Palm Beach County’s older incinerator. **Miami-Dade County’s website boasts that “[t]he Renewable Energy Facility in West Palm Beach is a \$672,000,000, state-of-the-art waste-to-energy facility – the most advanced, efficient, cleanest and greenest waste-to-energy power plant in the world.”<sup>1</sup>**

This report examines the actual reported emissions from the Palm Beach Renewable Energy Facility 2 incinerator, models what a new incinerator would emit if built in Miami-Dade County based on the emission rates of this “cleanest and greenest” incinerator combined with newer regulatory requirements, and compares how such a new incinerator would rank next to existing industrial air polluters in Miami-Dade County.

**This study finds that a new 4,000 ton/day trash incinerator in Miami-Dade County would be one of the largest industrial air polluters in the county. It would rank #1 in air emissions of ammonia, cadmium, dioxins/furans, hydrochloric acid, and sulfur dioxide, #3 in greenhouse gases and mercury, #4 in nitrogen oxides, #7 in lead and particulate matter, and #9 in carbon monoxide. Dioxins and furans are the most toxic chemicals known to science. This proposed incinerator would become responsible for 73% of the dioxin and furan emissions from industry in the county.**

This is based on a new incinerator emitting these pollutants at the same rate as Palm Beach Renewable Energy Facility 2 except for the two pollutants where pending new federal regulations would require meeting a stricter standard. In these cases (carbon monoxide and sulfur dioxide), this analysis assumes that emissions are further reduced by 40% as needed to meet new federal regulations for Large Municipal Waste Combustors, as proposed by the U.S. Environmental Protection Agency (EPA) in 2024 – which are due to be finalized in December 2025 and in effect by around 2029.

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<sup>1</sup> Miami-Dade County, “The Future of Solid Waste in Miami-Dade.” See section under “Waste-to-energy around the world.” <https://www.miamidade.gov/global/solidwaste/sustainable-solid-waste/wte-home.page>

This analysis is based solely on air emissions data reported from the incinerators themselves to the Florida Department of Environmental Protection, as well as emissions data from the U.S. Environmental Protection Agency’s National Emissions Inventory, Greenhouse Gas Reporting Program and Toxics Release Inventory databases, and the U.S. Energy Information Administration.

## BACKGROUND

Municipal solid waste (MSW) is the term for household and commercial trash. The closed Miami-Dade incinerator burned refuse-derived fuel (RDF), which is MSW that undergoes minimal processing to remove metal and glass before burning. Most trash incinerators burn MSW with no processing and are called “mass burn” facilities. The RDF vs. mass burn distinction is significant because RDF incinerators are held to weaker emissions standards for carbon monoxide and nitrogen oxides.

The newer incinerator in West Palm Beach (Palm Beach Renewable Energy Facility 2) is the only one in the U.S. that operates under more protective modern standards for nitrogen oxides (NOx), a pollutant that contributes to ground-level ozone (smog) and triggers asthma attacks. It is the only incinerator in the nation using selective catalytic reduction (SCR) technology for reduction of nitrogen oxides. Any new incinerator would also have to use SCR.

Incinerator Name	Owner	Operator	Opened	Closed	Fuel*	Capacity (tons/day)
Palm Beach Renewable Energy Facility 1	Palm Beach County	Covanta (Reworld)	1989		RDF	2,000
Palm Beach Renewable Energy Facility 2	Palm Beach County	Covanta (Reworld)	2015		MSW	3,000
Miami-Dade County Resource Recovery Facility	Miami-Dade County	Covanta (Reworld)	1981	2023	RDF	2,592
	Miami-Dade County		~2032		MSW	4,000

\* RDF = Refuse Derived Fuel (pulled out the metals and glass, then pelletizing or shredding waste before burning);  
MSW = municipal solid waste (burning waste without processing, also called “mass burn”)

### How are incinerator air emissions regulated?

There are many misconceptions about air pollution regulation. Smokestack industries paint a certain narrative. They claim that they use continuous emissions monitors to measure their pollution and that the state regulatory agencies get this data. They claim that the state regulatory agencies subject them to strict standards and would fine them heavily if they exceed a permit limit. They also claim that they are continually well within their permit limits and that staying within permit limits means that they’re safe and clean and do not cause any harm to public health or the environment.

The reality is quite a different story, however.

In order to have a protective air pollution regulatory system, the following are needed:

- Strong, protective standards
- Continuous emissions monitoring
- Aggressive enforcement

In the U.S., all three links in this chain are broken, making the industry narrative misleading.

**Incinerators are not always within permit limits.** Violations in the industry are not unusual. Some incinerators are known to include a check with their quarterly reports to the state environmental agency when they submit their continuous emissions monitoring data, acknowledging and paying for the violations they've had in that quarter. It is the cost of doing business.

**Enforcement is lax and fines are not sufficient to change behavior.** State enforcement agencies are notoriously lax and understaffed. When notices of violation are issued, they're often accompanied by zero fines, or fine amounts are allowed to be negotiated down. Imagine being stopped for speeding and telling the officer that you think you should pay \$30, not \$150 for a ticket. This actually happens when incinerators and other industrial facilities are issued proposed fines for violations, and agencies allow fines to be negotiated down.

Fines are rarely significant enough to change profitable behaviors, no matter how harmful they might be. Even "large" fines can amount to just a few days of tipping fee revenue (the amounts paid to the incinerator to dispose of waste by the ton, which is an incinerator's main source of revenue). Fines are insufficient to cause an incinerator owner to invest in needed boiler upgrades or more protective emissions controls, which are more costly than habitually paying fines. Some states even limit the amount of fines under old laws that ensure that fines are just an annoyance to be budgeted for – a "cost of doing business," rather than a deterrent.<sup>2</sup>

**Emissions limits are not strict.** State environmental agencies issue air permits with emissions limits for about a dozen select pollutants (not all pollutants). State and local governments are empowered by the federal Clean Air Act to adopt more protective standards than the federal minimums.<sup>3</sup> This rarely happens, though, as state agencies and permit limits are typically set to the minimum standards in federal regulations. The federal regulations for large municipal waste combustors<sup>4</sup> were last adopted in 2006 and are required by federal law to be updated every five years. However, EPA had to be sued in federal court to enforce this requirement, and finally proposed a new rule in January 2024. That rule was to be finalized by December 2024, but that deadline was extended to December 2025 with the reopening of a comment period. It is unclear whether the rule will be finalized and implemented under the Trump administration. When EPA first proposed these overdue new regulations, during a presentation in early 2023, the agency suggested low, medium, and high levels of emissions reductions for nine pollutants. When EPA's draft rule came out, it became clear that EPA chose the weakest of the three options for eight of the nine regulated pollutants, and the middle option for nitrogen oxides.

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<sup>2</sup> For example, in October 2020, the Covanta Plymouth Renewable Energy trash incinerator in Montgomery County, Pennsylvania was fined \$218,393 for violations relating to operational problems causing loud noise and burning plastic and electrical fire smells in the community that have been recurring for over three years now. That amount was considered to be a large fine, but amounted to about three days of Covanta's tipping fee revenues, and failed to stop the recurring problems that continue to this day.

<sup>3</sup> The Clean Air Act, at 42 U.S.C. § 7416, states: "Retention of State authority – Except as otherwise provided in sections 119(c), (e), and (f) (as in effect before the date of the enactment of the Clean Air Act Amendments of 1977), 209, 211(c)(4), and 233 (preempting certain State regulation of moving sources) **nothing in this Act shall preclude or deny the right of any State or political subdivision thereof** to adopt or enforce (1) any standard or limitation respecting emissions of air pollutants or (2) any requirement respecting control or abatement of air pollution; except that if an emission standard or limitation is in effect under an applicable implementation plan or under section 111 or 112, such State or political subdivision may not adopt or enforce any emission standard or limitation which is less stringent than the standard or limitation under such plan or section."

<sup>4</sup> Large Municipal Waste Combustors are trash incinerators where each burner can burn more than 250 tons/day – a size which pertains to all of the incinerators discussed here. See: <https://www.epa.gov/stationary-sources-air-pollution/large-municipal-waste-combustors-lmwc-new-source-performance>

**Permit limits are not based on health and safety, but are technology-based.** Permitted emission limits set by state environmental agencies are not based on health and safety. Arguments that complying with permit limits equates to “no harm to health and the environment” are a fallacy. As some state environmental regulators have admitted, permit limits are technology-based standards, and do not ensure that there will be no harm to public health.<sup>5</sup> Many permit limits also factor in the cost to a facility, allowing companies to choose cheaper control technologies if more protective ones are deemed too expensive.<sup>6</sup>

**Bigger plants are permitted to be dirtier because permit limits are concentration-based.** Air pollution permits are written in such a way that allowed emissions are in units such as parts *per* million (ppm) or micrograms *per* dry standard cubic meter ( $\mu\text{g}/\text{dscm}$ ). It’s always “per” something, representing the concentration of a pollutant in a certain volume of air. This design means that a 1,000 ton/day trash incinerator would be allowed to emit a certain amount of a pollutant, but a 4,000 ton/day trash incinerator is allowed to emit four times as much.

**Two ways to pass a test.** Moreover, regulations allow incinerators to comply by showing a certain percentage reduction for certain pollutants such as mercury, sulfur dioxide, and hydrochloric acid as an alternative way to meet a limit. In other words, an incinerator can be violating a concentration-based limit, but if the amount going into the pollution control device is so high that they achieve a certain percentage reduction, then they are still deemed to be in compliance.

For example, the Palm Beach County Renewable Energy Facility 2 incinerator has a permit limit for mercury of “50 micrograms per dry standard cubic meter or 15 percent of the potential mercury emission concentration (85-percent reduction by weight)... whichever is less stringent.” This means they can comply by measuring (once a year!) a mercury emissions concentration of 49  $\mu\text{g}/\text{dscm}$  – or they could have 666  $\mu\text{g}/\text{dscm}$  going into the pollution controls, and only 100  $\mu\text{g}/\text{dscm}$  coming out, which is an 85% reduction that allows them to emit twice the 50  $\mu\text{g}/\text{dscm}$  limit.

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<sup>5</sup> 8/28/2007 Pennsylvania Department of Environmental Protection public hearing on BioNol’s proposed natural gas-powered ethanol biorefinery in Clearfield, Pennsylvania. [youtu.be/HQtYtEJq4wI](https://youtu.be/HQtYtEJq4wI) When questioned about why residents were told that the proposed air pollution permit means that the facility would be healthy and safe for the community, while permit limits were six times different at a same-sized second ethanol biorefinery proposed eight miles away in Curwensville (but powered by waste coal, not natural gas). DEP’s engineer stated: “The quick answer is that our evaluation is based on technology standards, not health standards... The underlying concept around the country is technology based. What it says essentially is that as older plants and older sources fall apart and become useless and are replaced, they need to be replaced with things that are cleaner. ...We don’t make evaluations of permits based on health standards in a direct fashion. ...For some of the large, very large permits like that one [a waste coal burning power plant], there are direct analysis of health issues. In this case, there is none. Typically, for smaller cases like this one, there isn’t any. ...Are we looking at the cumulative impacts [of multiple large pollution sources] ... the answer is ‘no.’”

<sup>6</sup> The federal Clean Air Act has several standards that apply, nearly all of which allow for cost considerations. Sections 108-109 set National Ambient Air Quality Standards (NAAQS) for which states must adopt State Implementation Plans to reduce certain pollutants. In areas considered to be in attainment with NAAQS for criteria air pollutants (nitrogen oxides, sulfur dioxide, carbon monoxide, particulate matter, ozone precursors such as volatile organic compounds, and lead), a facility must meet Reasonably Available Control Technology (RACT) standards, where economic feasibility is a factor, and more expensive technology can be ruled out. In “non-attainment” (unacceptably polluted) areas, the Lowest Achievable Emissions Rate (LAER) standard is applied for that specific pollutant. LAER *does not* consider cost, but allows for a facility to buy offsets (a right to pollute) from polluters in other areas that have closed or reduced their pollution. Section 111 of the Clean Air Act sets New Source Performance Standards for nine pollutants: particulate matter, carbon monoxide, dioxins/furans, sulfur dioxide, nitrogen oxides, hydrogen chloride, lead, mercury, and cadmium. For these, EPA must look at what is maximally achievable to reduce emissions rates, but must also assess the financial implications and must avoid a mandate that would cause “serious economic disruption in the industry.” Section 112 of the Clean Air Act sets National Emissions Standards for Hazardous Air Pollutants (NESHAPS), for which cost is not to be considered.

**Emissions monitoring is not always honest.** There's the possibility that Covanta's emissions data is not honest. Both annual stack tests and continuous emissions monitors have been rigged at trash incinerators, by Covanta and others, but are rarely caught. In Connecticut, Covanta was fined \$20,000 in a civil action filed by the state Attorney General in response to an employee adjusting a continuous emissions monitoring device to alter a reading in order to pass a continuous emissions monitoring audit.<sup>7</sup> In Tulsa, Oklahoma, Covanta was the target of a criminal investigation by the U.S. Attorney's Office "related to alleged improprieties in the recording and reporting of emissions data" in which Covanta entered into a non-prosecution agreement to follow applicable laws and regulations and pay a \$200,000 "community service payment" to the state environmental agency.<sup>8</sup> At other incinerators, including some run by Covanta, the operator has stockpiled cleaner-burning materials like cardboard to use on its annual stack testing day, to make it seem as if their emissions are cleaner year-round.

**There is no safe dose of several chemicals incinerators release.** Some chemicals released by incinerators have no safe dose, such as dioxins,<sup>9</sup> lead,<sup>10</sup> mercury,<sup>11</sup> and particulate matter.<sup>12</sup>

**Only a few chemicals are monitored continuously (none of the toxic ones), and only about ten others are tested at all (typically once per year).** Only three pollutants are monitored on a continuous basis at most trash incinerators: nitrogen oxides (NOx), sulfur dioxide (SO<sub>2</sub>), and carbon monoxide (CO). Some larger incinerators will also continuously monitor carbon dioxide (CO<sub>2</sub>). Some parameters are also continuously monitored, like temperature, oxygen, and opacity (darkness of emissions). In rare cases, additional pollutants are monitored on a continuous basis, such as the six trash incinerators in Pennsylvania having to continuously monitor their hydrochloric acid emissions. Other pollutants, if monitored at all, are typically tested once per year, and sometimes less frequently. These other pollutants that are typically tested once per year in an annual stack test are ammonia, dioxins/furans, hydrochloric acid, particulate matter, mercury, lead, and cadmium.

In the case of dioxins and furans, the most toxic chemicals known to science, federal regulations allow just one burner to be tested each year, so an incinerator with three burners (like Palm Beach Renewable Energy Facility 2 or Wheelabrator South Broward) test each burner once every three years, rotating which burner they test each year.

To illustrate, if speeding motorists were regulated the way most industrial air polluters are, it would be akin to enforcing a speed limit by allowing drivers to drive all year with no speedometer. Once a year, a speed trap would be set on the highway with signs warning "slow down... speed trap ahead," and the driver's designee would be running the speed trap (companies choose who they pay to conduct the test).

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<sup>7</sup> See page 37 for this 1993 incident reported in this 93-page compilation of Covanta's U.S. violations through September 2006: [www.energyjustice.net/files/incineration/covanta/violations2006.pdf](http://www.energyjustice.net/files/incineration/covanta/violations2006.pdf)

<sup>8</sup> Covanta Holding Corporation's 2019 10-K Securities and Exchange Commission filing, p. 105. (see "Tulsa Matter" describing the consequences of this 2013 incident) [d18rn0p25nwr6d.cloudfront.net/CIK-0000225648/992dfb7f-398d-4b17-8e33-75e956f6f235.pdf](https://d18rn0p25nwr6d.cloudfront.net/CIK-0000225648/992dfb7f-398d-4b17-8e33-75e956f6f235.pdf)

<sup>9</sup> "No evidence of dioxin cancer threshold," *Environmental Health Perspectives* 2003 Jul; 111(9): 1145-1147. [www.ncbi.nlm.nih.gov/pmc/articles/PMC1241565/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1241565/)

<sup>10</sup> "Lead in the environment: No safe dose," Harvard University excerpt of *The Lancet* (Sept. 11, 2010). [www.hsph.harvard.edu/news/multimedia-article/lead/](http://www.hsph.harvard.edu/news/multimedia-article/lead/)

<sup>11</sup> "Mercury Exposure and Children's Health," *Current Problems in Pediatric and Adolescent Health Care*, 2010 September; 40(8): 186-215. [www.ncbi.nlm.nih.gov/pmc/articles/PMC3096006/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3096006/)

<sup>12</sup> World Health Organization, "Ambient (outdoor) air pollution," May 2, 2018. [www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](http://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health)

The technology exists to continuously monitor over 50 pollutants from incinerators<sup>13</sup>, but this is not required by state or federal regulations, so it is rare than an incinerator monitors any of the toxic chemicals on a continuous basis.

Failure to continuously monitor these more dangerous chemicals means that testing is only done during optimal operating conditions, as testing is not allowed to be conducted during startup, shutdown, or malfunction times, when emissions are known to be higher.

**Testing emissions just once per year can greatly understate actual emissions.** At the nation's largest waste incinerator, Reworld (Covanta) Delaware Valley in the City of Chester, Pennsylvania, continuous emissions monitoring of hydrochloric acid emissions shows that actual emissions are 62% higher than their annual stack tests indicate.

Dioxin and furan emissions are an even more stark example. One study out of Europe documented that using continuous sampling for dioxins at incinerators revealed the actual emissions to be 32-52 times higher than we think they are in the U.S. when requiring incinerators to test each unit just once every one to four years under ideal operating conditions.<sup>14</sup> A more recent study found that failure to use continuous sampling technology is underestimating dioxin emissions by 460 to 1,290 times.<sup>15</sup>

In 2023, the Oregon state legislature passed a law (SB 488) requiring the state's only trash incinerator, also a Covanta plant, to continuously monitor nine toxic metals and to continuously sample dioxins/furans and PCBs.<sup>16</sup> After many delays, legal threats, and winning an exemption from the legally required dioxin/furan and PCB monitoring, Covanta announced that they'll be closing their incinerator by December 31, 2024 – just before they'd have to start continuously monitoring for their toxic metal emissions.<sup>17</sup> They continued to violate the law until closing in January 2025. Instead of complying, the company filed a legal challenge to the monitoring law while also getting legislation introduced seeking to repeal the law in the 2025 legislative session in the hopes of continuing to operate the plant and seeking to sell it back to the county.

Covanta lobbied against Oregon's SB 488, and against a similar bill in the Hawaii state legislature in 2024.<sup>18</sup> Covanta is the nation's largest waste incineration corporation, and operates 32 of the 62 remaining trash incinerators still operating as of January 24, 2025 (after closing both of their California incinerators in 2024 and their Oregon incinerator in January 2025). The aggressive effort to avoid continuous monitoring at their Oregon incinerator raises questions of whether the company is concerned about what results from continuous monitoring at any single facility would reveal about underestimated emissions across their entire fleet.

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<sup>13</sup> "Continuous Emissions Monitors (CEMs)." <https://www.einet.org/toxics/cems/>

<sup>14</sup> De Fré R, Wevers M. "Underestimation in dioxin emission inventories," *Organohalogen Compounds*, 36: 17–20. [www.einet.org/toxics/cems/1998\\_DeFre\\_OrgComp98\\_Underest\\_Dioxin\\_Em\\_Inv\\_Amesa.pdf](https://www.einet.org/toxics/cems/1998_DeFre_OrgComp98_Underest_Dioxin_Em_Inv_Amesa.pdf)

<sup>15</sup> Arkenbout, A, Olie K, Esbensen, KH. "Emission regimes of POPs of a Dutch incinerator: regulated, measured and hidden issues." [docs.wixstatic.com/ugd/8b2c54\\_8842250015574805aeb13a18479226fc.pdf](https://docs.wixstatic.com/ugd/8b2c54_8842250015574805aeb13a18479226fc.pdf)

<sup>16</sup> Oregon SB 488 of 2023. <https://olis.oregonlegislature.gov/liz/2023R1/Downloads/MeasureDocument/SB488>

<sup>17</sup> Beyond Toxics, "Reworld Waste Incinerator Announces Closure," Oct. 11, 2024. [https://www.beyondtoxics.org/wp-content/uploads/2024/10/BeyondToxics\\_PressRelease\\_Reworld-announces-closure\\_10-11-24.pdf](https://www.beyondtoxics.org/wp-content/uploads/2024/10/BeyondToxics_PressRelease_Reworld-announces-closure_10-11-24.pdf)

<sup>18</sup> Hawai'i SB 2101 SD1 of 2024. [https://www.capitol.hawaii.gov/session/measure\\_indiv.aspx?billtype=SB&billnumber=2101&year=2024](https://www.capitol.hawaii.gov/session/measure_indiv.aspx?billtype=SB&billnumber=2101&year=2024)

The chart below shows the frequency of testing required by Palm Beach Renewable Energy Facility 2 under their Title V Operating Permit, the air pollution permit granted by Florida DEP. This arrangement is typical for trash incinerators in the U.S.

## Testing Requirements in Title V Operation Permit for Palm Beach Renewable Energy Facility 2 Trash Incinerator

Chemical	Abbreviation	Testing frequency under state permit	Category
Sulfur dioxide	SO <sub>2</sub>	Continuous	Criteria air pollutant
Nitrogen Oxides	NO <sub>x</sub>	Continuous	Criteria air pollutant
Carbon Monoxide	CO	Continuous	Criteria air pollutant
Particulate Matter *	PM / PM10 / PM2.5	Annual	Particulate matter
Carbon dioxide	CO <sub>2</sub>	Optional (must monitor CO <sub>2</sub> or oxygen continuously)	Global warming pollutant
Ammonia	NH <sub>4</sub>	Annual	
Dioxins/Furans	D/F	One burner per year (each burner once every three years)	Highly toxic organohalogens
Polychlorinated biphenyls	PCBs	Never	Highly toxic organohalogens
Per- and polyfluoroalkyl substances	PFAS	Never	Highly toxic organohalogens
Polycyclic Aromatic Hydrocarbons	PAHs	Never	
Volatile Organic Compounds	VOC	Annual	
Hydrochloric Acid	HCl	Annual	Acid gas
Hydrofluoric acid	HF	Never	Acid gas
Arsenic	As	Never	Toxic metal
Beryllium	Be	Never	Toxic metal
Cadmium	Cd	Annual	Toxic metal
Chromium (VI)	Cr (VI)	Never	Toxic metal
Lead	Pb	Annual	Toxic metal
Manganese	Mn	Never	Toxic metal
Mercury	Hg	Annual	Toxic metal
Nickel	Ni	Never	Toxic metal
Selenium	Se	Never	Toxic metal
Zinc	Zn	Never	Toxic metal

\* Opacity (darkness of emissions) is an indirect way of monitoring particulate matter and has to be monitored continuously and in an annual test of visible emissions, but is not a true replacement for actual PM testing.

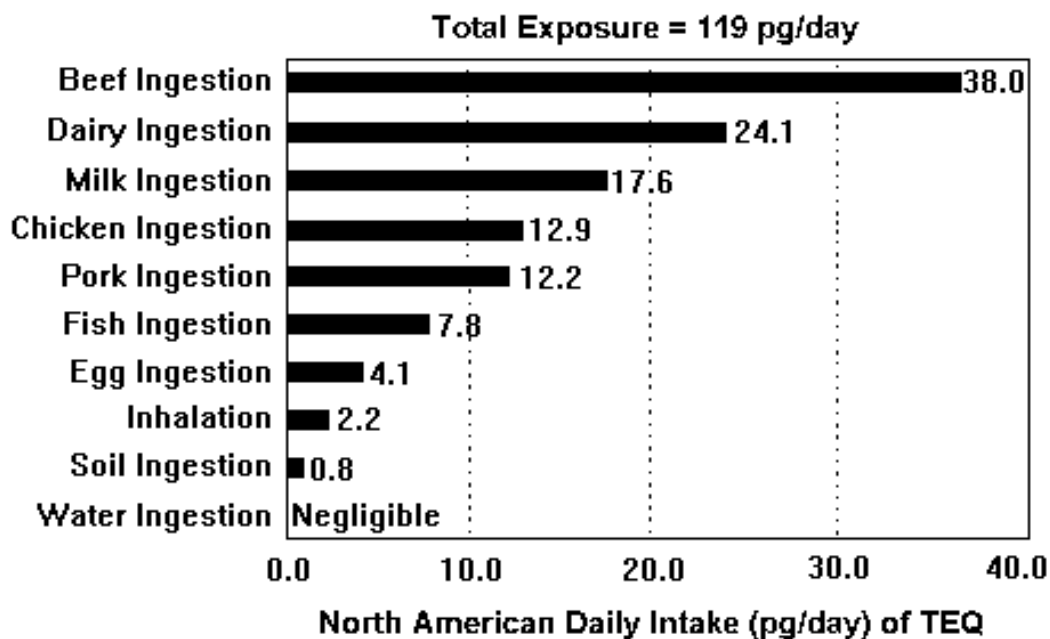


## Dioxin/Furan Emissions

Dioxins and furans are the most toxic class of chemicals known to science. They are largely created in combustion systems like waste incinerators and backyard burn barrels. Dioxins and furans are measured in relation to the most toxic variety of dioxin, which is known as 2,3,7,8 Tetrachlorodibenzo-p-dioxin, or 2,3,7,8-TCDD. Dioxins and furans are chemically similar and are often simply just referred to as dioxins, as the rest of this section does.

Dioxins are a known human carcinogen.<sup>19,20</sup> In addition to causing cancers, exposure to dioxin can also cause severe reproductive and developmental problems at levels 100 times lower than those associated with its cancer causing effects. Dioxin is well-known for its ability to damage the immune system and interfere with hormonal systems. It is associated with causing birth defects, inability to maintain pregnancy, decreased fertility, reduced sperm counts, endometriosis, diabetes, learning disabilities, immune system suppression, lung problems, skin disorders, lowered testosterone levels and much more.<sup>21,22</sup>

EPA has documented that 93% of exposure to dioxins comes through consuming meat and dairy products, since dioxins are fat-soluble and readily bioaccumulate in the food chain. EPA describes dioxins as hydrophobic and lipophilic, meaning that they avoid water but cling to fat. The following chart shows where people consuming a typical North American diet get their dioxin exposure.<sup>23</sup>



<sup>19</sup> See National Toxicology Program, "Report on Carcinogens, Fifteenth Edition -- 2,3,7,8-Tetrachlorodibenzo-p-dioxin," <https://ntp.niehs.nih.gov/sites/default/files/ntp/roc/content/profiles/tetrachlorodibenzodioxin.pdf>

<sup>20</sup> International Agency for Research on Cancer, "Polychlorinated Dibenzo-para-Dioxins and Polychlorinated Dibenzofurans," IARC Monographs on the Evaluation of Carcinogenic Risks to Humans – Volume 69, 1997. <https://publications.iarc.fr/87>

<sup>21</sup> Dioxin Homepage. <http://www.einet.org/dioxin>

<sup>22</sup> Center for Health, Environment & Justice, "The American People's Dioxin Report," p.11, 1999. <https://chei.org/wp-content/uploads/American%20Peoples%20Dioxin%20Report.pdf>

<sup>23</sup> U.S. Environmental Protection Agency, "Estimating Exposure to Dioxin-Like Compounds, Volume 1: Executive Summary," June 1994, p.36, Figure II-5. "Background TEQ exposures for North America by pathway." [https://oaspub.epa.gov/eims/eimscomm.getfile?p\\_download\\_id=438673](https://oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=438673)

Once ingested, men do not have a way of ridding their bodies of dioxin, but women have two ways: if pregnant, dioxin will cross the placenta into the growing fetus, and after childbirth, a nursing infant will be exposed via its mother's breast milk. It is estimated that approximately 10-14% of total lifetime dioxin exposure can occur via nursing.<sup>24,25</sup>

EPA classifies dioxins as 140,000 times more toxic than mercury for toxicity via oral exposure.<sup>26</sup> Health impacts are found at levels so small that emissions are measured in nanograms (ng) and exposures are measured in picograms (pg) as the chart above shows. While dioxins are the most toxic chemicals known to be released from incinerators, they are the least monitored. Typically only one burner per year has to be tested, so an incinerator with three burners has each burner tested just once every third year, while all other pollutants have to be tested at each burner annually (if not also continuously).<sup>27</sup>

Truly continuous emissions monitoring technology exists for dioxins but is not commercially available. However, continuous *sampling* technology has been commercially established since at least the late 1990s. Instead of having results immediately available on-site, continuous sampling collects a sample in a cartridge for up to 4-6 weeks, then that cartridge is switched out with a new one and sent to a lab to test for the cumulative amount of dioxins emitted over that span of time. This makes it possible to get the full picture of emissions, capturing data during startup, shutdown and malfunction times when dioxins are known to spike, even though the spikes aren't particularly visible because they're averaged into the sample across several weeks.

The most common continuous sampling method is known as AMESA (Adsorption Method for Sampling of Dioxins and Furans).<sup>28,29</sup> This and other methods were tested and verified by EPA in 2006.<sup>30</sup> Dioxin continuous sampling technology is not used in the U.S., but is used at incinerators in Europe as well as at the only new trash incinerator in Canada, the Durham York Energy Centre in Clarington, Ontario. When that incinerator opened in 2015 (same year as Palm Beach Renewable Energy Facility 2), it failed both of its initial dioxin stack tests, and has continued to experience documented exceedances at times (once with dioxin emissions 13.6 times the permitted limit), though it's hard to know how often there are exceedances because much of the data is not being released.

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<sup>24</sup> Patandin, S., Dagnelie, P.C., Mulder, P.G.H., Op de Coul, E., van der Veen, J.E., Weisglas-Kuperus, N., and Sauer, P.J.J. (1999) "Dietary exposure to polychlorinated biphenyls and dioxins from infancy until adulthood: A comparison between breast-feeding, toddler and long-term exposure." *Environmental Health Perspectives* 107 (1): 45-51. <https://pmc.ncbi.nlm.nih.gov/articles/PMC1566290/>

<sup>25</sup> Schechter, A., Papke O., Lis, A., Ball, M., Ryan, J.J., Olson, J.R., Li, L., and Kessler, H. (1996) "Decrease in milk and blood dioxin levels over two years in a mother nursing twins: Estimates of decreased maternal and increased infant dioxin body burden from nursing." *Chemosphere* 32 (3): 543-549. <https://pubmed.ncbi.nlm.nih.gov/8907231/>

<sup>26</sup> U.S. Environmental Protection Agency, Risk-Screening Environmental Indicators (RSEI) Model. <https://www.epa.gov/rsei>

<sup>27</sup> The alternative performance testing schedule for dioxins/furans (D/F) specified in 40 CFR 60.58b(g)(5)(iii) allow testing at just one unit each year so long as they stay under 7 ng/dscm. <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-60/subpart-Eb/section-60.58b>

<sup>28</sup> U.S. Environmental Protection Agency, "ETV Joint Verification Statement -- Adsorption Method for Sampling Dioxins and Furans," 2006. <https://archive.epa.gov/nrmrl/archive-etv/web/pdf/600etv06047sv2.pdf>

<sup>29</sup> Wikipedia, "Adsorption Method for Sampling of Dioxins and Furans," [https://en.wikipedia.org/wiki/Adsorption\\_Method\\_for\\_Sampling\\_of\\_Dioxins\\_and\\_Furans](https://en.wikipedia.org/wiki/Adsorption_Method_for_Sampling_of_Dioxins_and_Furans)

<sup>30</sup> U.S. Environmental Protection Agency Environmental Technology Verification Program, "Dioxin Emission Monitoring Systems," <https://archive.epa.gov/nrmrl/archive-etv/web/html/vt-ams.html#dems>

[The following is drawn verbatim from “CAUTIONARY TALES: Examples from across Canada,” a report discussing Canada’s trash incinerators.<sup>31</sup> Find the footnoted references in original, as cited.]

### **Issues At The Durham/York Incinerator (DYEC): Stack Exceedances in 2015,2016 for dioxins and furans**

Acceptance stack testing in early October 2015, found dioxin/furan emissions in exceedance of the stack limit for both boilers during initial tests.<sup>7</sup> Stack source testing in May 2016 again found a dioxins/furans exceedance. One boiler was emitting 818 pg TEQ/m<sup>3</sup> while the emission limit is 60 pg TEQ/m<sup>3</sup>.<sup>8</sup> For the May 2016 major exceedance there was no indication from the continuous emissions monitors (CEMS) in the control room that there were problems.<sup>9</sup>

Stack source testing is pre-announced and completed only twice a year (once for compliance, once voluntarily). Dioxins/furans stack source testing only provides a snapshot as it covers less than 0.5% of the facility’s operating time. Short-term (hourly, daily, weekly) dioxins/furans stack concentrations for the remaining 99.5+% of the year are unknown. This concern applies to most pollutants - including heavy metals, polycyclic aromatic hydrocarbons (PAH)s, and volatile organic compounds (VOCs) which are monitored at the stack less than 1% of operational time.

The duration of the exceedance for dioxins/furans in 2016 is unknown. The Regions are required under the Environmental Compliance Approval (ECA) to conduct long-term sampling of dioxins and furans,<sup>10</sup> however the Regions have withheld the monthly sampling data from 2015 to 2019, despite public requests. Two [Freedom of Information] requests filed in May 2019 remain active. The owners shut down the DYEC for a period after the May 2016 exceedance. An abatement plan followed.<sup>11</sup> Multiple problems were identified.<sup>12</sup> Major repairs, operational changes were made.<sup>13</sup>

### **Ambient air exceedance in 2018 for dioxins/furans**

A concerning ambient air exceedance of dioxins/furans occurred in May 2018 at a DYEC ambient air monitoring station.<sup>14</sup> The Regions’ consultant’s limited review concluded “the DYEC is unlikely to have substantially contributed to the elevated D/F concentration”.<sup>15</sup> Members of the public contend that the investigation of this troubling exceedance was inadequate and did not include review of all pertinent data. The source cause of the exceedance remains unexplained.

### **Ongoing concerns with dioxins/furans AMESA reporting**

Long-term sampling for dioxins and furans is required under the ECA. Durham uses the AMESA system for sampling. Dioxins/furans are collected in a cartridge over a month and sent for analysis. The public advocated for this monitoring during the Environmental Assessment and ECA phases. The Regions have withheld the monthly data for years 2015 to 2019. From 2020 onward, the Regions have provided some of the data, however, do not provide the underlying lab and other reports. Over time the Regions modified the sampling equipment and developed sampling procedures and protocols, including for data validation. In short, the reporting is neither traceable nor transparent.

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<sup>31</sup> Maxwell, S., Benneian, L., Bracken, W., and Gasser, L., “CAUTIONARY TALES: Examples from across Canada,” Dec. 2023.  
<https://drive.google.com/file/d/1-oet-KSfK60A7tTVUR5SaTYPZHVT4qui/view>

## HOW POLLUTING IS A NEW INCINERATOR?

No incinerator is “clean,” as all involve putting significant amounts of pollutants into the air. The question is a relative one. Yes, newer trash incinerators such as Palm Beach Renewable Energy Facility 2 are less polluting than the older generation. However, Palm Beach Renewable Energy Facility 2 is still a major air polluter. A new incinerator such as Miami-Dade County is pursuing would largely use the same technology that Palm Beach Renewable Energy Facility 2 uses.

A new incinerator may have to meet somewhat stricter EPA regulations for Large Municipal Waste Combustors. However, except for two pollutants, Palm Beach Renewable Energy Facility 2 already meets these pending regulations, which means that the emissions from a new incinerator can be expected to be similar to those from Palm Beach Renewable Energy Facility 2 except for carbon monoxide (CO) and sulfur dioxide (SO<sub>2</sub>), where an additional 40% emissions reduction would be needed to meet the proposed new regulations.

**As this report documents, a new 4,000 ton/day trash incinerator in Miami-Dade County, permitted under the proposed new federal regulations, would be one of the largest industrial air polluters in the county. It would rank #1 in air emissions of ammonia, cadmium, dioxins/furans, hydrochloric acid, and sulfur dioxide, #3 in greenhouse gases and mercury, #4 in nitrogen oxides, #7 in lead and particulate matter, and #9 in carbon monoxide.**

## METHODOLOGY

In Florida, emissions data is reported by incinerator owners to the state Department of Environmental Protection (DEP). Documents on these facilities are available online through DEP’s Oculus system. Stack test reports and annual operating reports are among these online files. Stack test reports offer the emissions test data for the once-per-year tests, presenting them in units that line up with the permit limits in the incinerators’ Title V air pollution permit issued by DEP under the Clean Air Act. Annual operating reports offer calculated estimates of the annual amount of each pollutant released. Since few air pollutants are measured continuously, most of this data is based on once per year stack tests under optimal operating conditions. This means that the emissions data can be optimistic since the calculation method assumes that the facility operates under those optimal conditions all year. The lack of continuous emissions monitoring results in annual emissions estimates that are likely lower than reality.

2020 data for the Palm Beach County incinerators was not able to be found in DEP’s Oculus system, so values were obtained from EPA’s National Emissions Inventory, which contains the same sort of data as obtained from state agencies like DEP.

The pounds of each pollutant released per year from each facility were totaled and divided into the total amount of tons burned over those same years. Since a 2020 annual operating report could not be found for the Palm Beach County incinerators, data on the tons of waste burned was obtained from the Energy Information Administration’s Form 923 database, which tracks fuel usage by month for all electric generators.

With data from the Palm Beach Renewable Energy Facility 2 incinerator, the pounds of emissions per ton of waste were used as a model for what a new incinerator in Miami-Dade County would release. This was done in cases where the concentration-based emissions data fell within the limits of the January 2024 draft EPA regulations for Large Municipal Waste Combustors. There are two pollutants for which the Palm Beach Renewable Energy Facility 2 emissions exceed this new standard for new incinerators: carbon monoxide and sulfur dioxide. For each of these, a further 40% reduction in emissions was assumed in order to bring emissions down sufficiently to meet the new standard.

Greenhouse gases are not tracked in the DEP's files, so data for carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) were obtained from EPA's Greenhouse Gas Reporting Program, the most accurate data source for such data. Since EPA intentionally uses outdated global warming potentials for methane, that data was adjusted to bring it in line with the latest global warming potentials for methane and nitrous oxide, and look at them over 20 years instead of 100.<sup>32</sup>

Dioxin data is not tracked in EPA's National Emissions Inventory, but can be obtained from EPA's Toxics Release Inventory (TRI) for many types of industrial facilities, which is released annually.<sup>33</sup> Since there were only two data points available for dioxin emissions from Miami-Dade County sources in 2020, an additional 17 data points were available and used to find average dioxin emissions levels for the four facilities reporting dioxin emissions to the TRI database between 2014 and 2023, making the data more robust, and matching the methodology of averaging multiple years of data from Palm Beach Renewable Energy Facility 2 to come up with a more honest comparison. Because waste incinerators have always been exempt from reporting to the TRI database, data on the old Miami-Dade County trash incinerator are not presented here.<sup>34</sup> Also, it should be noted that dioxin emissions levels are likely underestimated for lack of continuous sampling, but that the test methods for one facility vs. another are similar, so the underestimation applies to all facilities and the relative rankings of them are thus the most fair and accurate comparisons that can be made.

Using "pounds of a pollutant released per ton of waste burned" metrics for each air pollutant (see the table below), these metrics were multiplied times 4,000 tons of waste burned per day times 365 days per year times 95% for the capacity factor, which represents the percentage of a year that the facility is operating at full capacity. 95% is what a well-run facility should be capable of, but many older generation incinerators operate closer to 90% capacity.

The following chart shows the pounds per ton burned for the Palm Beach Renewable Energy Facility 2, averaging all available years of their emissions test data, then the calculated amount of emissions from a new 4,000 ton/day incinerator. The final column is the same except that carbon monoxide and sulfur dioxide are reduced by 40% to ensure that the emissions would fall within EPA's proposed new regulations for Large Municipal Waste Combustors.

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<sup>32</sup> A chart showing the evolving science on methane global warming potentials across International Panel on Climate Change (IPCC) reports, with links to the sources, is here: <https://www.energyjustice.net/naturalgas#GWP> EPA still uses global warming potential data from IPCC's Fourth Assessment Report in 2007, when the Fifth Assessment Report (2013) and Sixth Assessment Report (2021) show larger impacts from methane.

<sup>33</sup> U.S. Environmental Protection Agency, Toxics Release Inventory database. <https://www.epa.gov/toxics-release-inventory-tri-program>

<sup>34</sup> In April 2023, Energy Justice Network and the Public Employees for Environmental Responsibility filed a formal rulemaking petition with EPA to require that incinerators start reporting to the TRI database. On December 20, 2024, EPA granted the petition, requiring trash incinerators and certain other incinerators to start reporting to the TRI database. See: <http://www.energyjustice.net/tri>

<b>Chemical (all in lbs except GHGs)</b>	<b>Palm Beach REF 2 Lbs/Ton burned</b>	<b>Annual lbs from new 4,000 tpd plant</b>	<b>Annual lbs from new 4,000 tpd plant after adjusting for new regs, if adopted</b>
Ammonia	0.0294	40,715	40,715
Cadmium	0.00000585	8	8
Carbon monoxide	0.345	477,945	286,767
Dioxins/Furans	0.0000000036	0.0050	0.0050
Hydrochloric acid	0.0626	86,895	86,895
Lead	0.0000231	32	32
Mercury Compounds	0.00000768	11	11
Nitrogen Oxides	0.659	913,588	913,588
Particulate Matter	0.0318	44,138	44,138
Sulfur Dioxide	0.551	764,375	496,844
Greenhouse Gases (GHGs) [metric tons of CO <sub>2</sub> equivalents]	0.879	1,219,103	1,219,103

## **How would a new incinerator in Miami-Dade County rank among existing industrial air polluters?**

The following charts show how a new 4,000 ton/day trash incinerator operating under the pending regulations for new trash incinerators (large municipal waste combustors) compares to existing industrial air polluters in Miami-Dade County. The comparison data is the latest available from EPA's National Emissions Inventory, which is data from 2020. That data is published every third year, and 2023 data is supposed to be available in 2026. The tables below include the old county incinerator that is now closed, for reference. The rankings use the 2020 emissions data, but are ranked as if the theoretical proposed incinerator is operating in place of the old incinerator.

Note that there are no incinerators in the nation using any sort of carbon capture and sequestration technology, which is prohibitively expensive. Nonetheless, Miami-Dade County is looking around the world at incinerators that are experimenting with such technology, and claims to want to implement that in a new plant, even though there are no legal requirements for it, nor are any such regulations on the horizon. The rankings below are based on the current regulatory requirements plus proposed regulations, which do not include CO<sub>2</sub> limits.

## Summary of rankings:

Pollutant	New incinerator's rank among Miami-Dade County industrial air polluters	New incinerator's percentage of total emissions from Miami-Dade County industrial air polluters
Ammonia	1	54%
Cadmium	1	56%
Carbon monoxide	9	2%
Dioxins/furans	1	73%
Hydrochloric acid	1	84%
Lead	7	2%
Mercury	3	11%
Nitrogen Oxides	4	1%
Particulate Matter	7	3%
Sulfur Dioxide	1	34%
Greenhouse Gases	3	16%

## Emissions rankings of new incinerator vs. 2020 EPA data on existing industrial air polluters in Miami-Dade County:

[Comparison data from EPA's 2020 National Emissions Inventory and, for dioxins/furans, EPA's Toxics Release Inventory]

Pollutant	Facility	Industry
<b>Greenhouse Gases (CO<sub>2</sub>e) [Metric tons]</b>		
2,363,081	Turkey Point Power Plant (Florida Power & Light)	1,224 MW gas fired power plant
1,305,341	Titan Florida LLC	Waste burning cement kiln
1,219,103	<b>Proposed 4,000 ton/day Trash Incinerator</b>	Incinerator
792,912	Miami-Dade County - North Dade Landfill	Landfill
752,748	<b>Covanta Dade 2,592 ton/day Trash Incinerator [closed]</b>	Incinerator
679,213	Cemex Construction Materials FL. LLC.	Cement kiln
530,473	WM - Medley Landfill	Landfill
263,971	Miami International Airport	Airport
230,057	Miami-Dade County - South Dade Landfill	Landfill
209,469	58th St Landfill (Main County LF)	Landfill
29,605	Homestead Air Reserve Base - Airport	Airport
22,288	Opa Locka Executive Airport	Airport
21,951	Kendall-Tamiami Executive Airport	Airport
10,137	Homestead General Aviation	Airport
557	Miami	Airport
437	CSX Transportation – Hialeah	Rail Yard

<b>Ammonia (lbs)</b>		
40,715	<b>Proposed 4,000 ton/day Trash Incinerator</b>	Incinerator
34,356	Turkey Point Power Plant (Florida Power & Light)	1,224 MW gas fired power plant
685	NUSFC, LLC	Iron Foundry
8	CSX Transportation - Hialeah	Rail Yard

<b>Cadmium (lbs)</b>		
8.1	<b>Proposed 4,000 ton/day Trash Incinerator</b>	Incinerator
2.8	<b>Covanta Dade 2,592 ton/day Trash Incinerator [closed]</b>	Incinerator
1.9	Cemex Construction Materials FL. LLC.	Cement kiln
1.7	Titan Florida LLC	Waste burning cement kiln
1.0	Goodrich Corporation	Aerospace Product and Parts Manufacturing
0.7	NUSFC, LLC	Iron Foundry
0.6	U.S. Dept of Agriculture	Government agency
0.2	Jackson Memorial Hospital	Hospital
0.1	Quikrete Companies, LLC	Concrete Product Manufacturing
0.0	Hometown Foods USA, LLC	Bakery
0.0	Sunlite Sales, Inc.	Metal Coating / Engraving
0.0	Hydro Conduit, LLC (DBA Rinker Materials)	Concrete Block and Brick Manufacturing

<b>Dioxins and furans (lbs)</b>		
0.005	<b>Proposed 4,000 ton/day Trash Incinerator</b>	Incinerator
0.00078	Cemex Construction Materials FL. LLC.	Cement kiln
0.00049	Titan Florida LLC	Waste burning cement kiln
0.00028	Turkey Point Power Plant (Florida Power & Light)	1,224 MW gas fired power plant
0.00027	NUSFC, LLC	Iron Foundry

<b>Hydrochloric acid (lbs)</b>		
86,895	<b>Proposed 4,000 ton/day Trash Incinerator</b>	Incinerator
89,728	<b>Covanta Dade 2,592 ton/day Trash Incinerator [closed]</b>	Incinerator
9,440	WM - Medley Landfill	Landfill
6,433	Cemex Construction Materials FL. LLC.	Cement kiln
774	Titan Florida LLC	Waste burning cement kiln
111	NUSFC, LLC	Iron Foundry
30	U.S. Dept of Agriculture	Government agency

<b>Lead (lbs)</b>		
807	Kendall-Tamiami Executive Airport	Airport
520	Opa Locka Executive Airport	Airport
332	Homestead General Aviation	Airport
183	NUSFC, LLC	Iron Foundry
73	Cemex Construction Materials FL. LLC.	Cement kiln
70	Miami International Airport	Airport



57	<b>Covanta Dade 2,592 ton/day Trash Incinerator [closed]</b>	Incinerator
32	<b>Proposed 4,000 ton/day Trash Incinerator</b>	Incinerator
7	Titan Florida LLC	Waste burning cement kiln
3	Turkey Point Power Plant (Florida Power & Light)	1,224 MW gas fired power plant
2	Miami	Airport
0	Quikrete Companies, LLC	Concrete Product Manufacturing
0	Goodrich Corporation	Aerospace Product and Parts Manufacturing
0	Jackson Memorial Hospital	Hospital
0	Hometown Foods USA, LLC	Bakery
0	Derby Building Products, LLC	Plastics Pipe & Pipe Fitting
0	Sunlite Sales, Inc.	Metal Coating / Engraving
0	Hydro Conduit, LLC (DBA Rinker Materials)	Concrete Block and Brick Manufacturing

<b>Mercury (lbs)</b>		
51	Titan Florida LLC	Waste burning cement kiln
30	Cemex Construction Materials FL. LLC.	Cement kiln
11	<b>Proposed 4,000 ton/day Trash Incinerator</b>	Incinerator
8	NUSFC, LLC	Iron Foundry
5	<b>Covanta Dade 2,592 ton/day Trash Incinerator [closed]</b>	Incinerator
0.040795	58th St Landfill (Main County LF)	Landfill
0.016549	South Florida Water Management District	Administration of Water Resources
0.008000	Asahi Refining Florida, Inc. - Miami Gardens	Secondary Smelting / Refining
0.003719	CSX Transportation - Hialeah	Rail Yard
0.001577	Miami-Dade Water and Sewer Department - 3869 Rickenbacker Causeway	Sewage Treatment Plant
0.000505	Turkey Point Power Plant (Florida Power & Light)	1,224 MW gas fired power plant
0.000066	Miami-Dade Water and Sewer Department - 1100 W 2nd Ave	Water Supply and Irrigation Systems
0.000020	WM - Medley Landfill	Landfill
0.000009	Miami-Dade Water and Sewer Department - 6800 SW 87th Ave	Sewage Treatment Plant
0.000002	Flowers Baking Company of Miami, LLC	Bakery
0.000002	Miami-Dade Water and Sewer Department - 2575 NE 156th St	Sewage Treatment Plant

<b>Nitrogen Oxides (lbs)</b>		
3,864,995	Titan Florida LLC	Waste burning cement kiln
3,615,200	Cemex Construction Materials FL. LLC.	Cement kiln
2,454,167	<b>Covanta Dade 2,592 ton/day Trash Incinerator [closed]</b>	Incinerator
1,749,041	Miami International Airport	Airport
913,588	<b>Proposed 4,000 ton/day Trash Incinerator</b>	Incinerator
551,631	Homestead Air Reserve Base - Airport	Airport
526,927	Miami-Dade Water and Sewer Department - 6800 SW 87th Ave	Sewage Treatment Plant
359,643	Turkey Point Power Plant (Florida Power & Light)	1,224 MW gas fired power plant
163,499	South Florida Water Management District	Administration of Water Resources
138,215	Miami-Dade Water and Sewer Department - 8932 SW 232nd St	Sewage Treatment Plant

125,254	Miami-Dade Water and Sewer Department - 2575 NE 156th St	Sewage Treatment Plant
107,000	WM - Medley Landfill	Landfill
103,162	Miami-Dade Water and Sewer Department - 3869 Rickenbacker Causeway	Sewage Treatment Plant
100,860	Opa Locka Executive Airport	Airport
47,421	Miami-Dade Water and Sewer Department - 1100 W 2nd Ave	Water Supply and Irrigation Systems
23,566	Homestead General Aviation	Airport
18,728	CSX Transportation - Hialeah	Rail Yard
17,896	Kendall-Tamiami Executive Airport	Airport
13,038	Jackson Memorial Hospital	Hospital
11,842	Community Asphalt Corporation	Asphalt Plant
9,795	Miami-Dade County - South Dade Landfill	Landfill
7,683	Homestead Air Reserve Base	Military Base
7,409	Miami-Dade County - North Dade Landfill	Landfill
7,353	Homestead City Utilities	Oil-burning Power Plant
7,100	NUSFC, LLC	Iron Foundry
4,029	Flowers Baking Company of Miami, LLC.	Bakery
1,999	Derby Building Products, LLC	Plastics Pipe & Pipe Fitting
1,240	Hometown Foods USA, LLC	Bakery
1,015	Kingspan Insulation, LLC	Plastics Product Manufacturing
784	Noven Pharmaceuticals, Inc.	Pharmaceutical Preparation Manufacturing
759	AAR Landing Gear Services	Aerospace Product and Parts Manufacturing
676	Miami	Airport
561	U.S. Dept of Agriculture	Government agency
354	Solo Printing, LLC	Printing
320	Bill Ussery Motors Body Shop, Inc	Auto Body / Paint Shop
280	Sunlite Sales, Inc.	Metal Coating / Engraving
210	Delta Apparel, Inc.	Printing
166	Goodrich Corporation	Aerospace Product and Parts Manufacturing
93	Aircraft Electric Motors, Inc.	Motor and Generator Manufacturing
59	Heico Corporation	Aerospace Product and Parts Manufacturing
45	Hydro Conduit, LLC (DBA Rinker Materials)	Concrete Block and Brick Manufacturing
16	Asahi Refining Florida, LLC - Opa-Locka	Secondary Smelting / Refining
12	Asahi Refining Florida, Inc. - Miami Gardens	Secondary Smelting / Refining
12	Aerothrust Holdings, LLC	Aircraft Manufacturing

<b>Sulfur Dioxide (lbs)</b>		
496,844	<b>Proposed 4,000 ton/day Trash Incinerator</b>	Incinerator
441,262	WM - Medley Landfill	Landfill
219,230	Miami International Airport	Airport
89,912	<b>Covanta Dade 2,592 ton/day Trash Incinerator [closed]</b>	Incinerator

66,040	Cemex Construction Materials FL. LLC.	Cement kiln
52,094	Homestead Air Reserve Base - Airport	Airport
45,951	Miami-Dade Water and Sewer Department - 8932 SW 232nd St	Sewage Treatment Plant
39,831	Titan Florida LLC	Waste burning cement kiln
32,877	NUSFC, LLC	Iron Foundry
27,245	Turkey Point Power Plant (Florida Power & Light)	1,224 MW gas fired power plant
15,481	South Florida Water Management District	Administration of Water Resources
11,359	Opa Locka Executive Airport	Airport
4,553	Miami-Dade County - South Dade Landfill	Landfill
4,082	Miami-Dade County - North Dade Landfill	Landfill
3,575	Kendall-Tamiami Executive Airport	Airport
3,037	Homestead General Aviation	Airport
2,067	Jackson Memorial Hospital	Hospital
1,809	Community Asphalt Corporation	Asphalt Plant
482	Homestead City Utilities	Oil-burning Power Plant
405	Miami-Dade Water and Sewer Department - 6800 SW 87th Ave	Sewage Treatment Plant
342	U.S. Dept of Agriculture	Government agency
337	Homestead Air Reserve Base	Military Base
139	Miami	Airport
132	Miami-Dade Water and Sewer Department - 1100 W 2nd Ave	Water Supply and Irrigation Systems
86	Miami-Dade Water and Sewer Department - 2575 NE 156th St	Sewage Treatment Plant
84	Miami-Dade Water and Sewer Department - 3869 Rickenbacker Causeway	Sewage Treatment Plant
26	Flowers Baking Company of Miami, LLC.	Bakery
20	Goodrich Corporation	Aerospace Product and Parts Manufacturing
20	Bill Ussery Motors Body Shop, Inc	Auto Body / Paint Shop
16	AAR Landing Gear Services	Aerospace Product and Parts Manufacturing
14	Asahi Refining Florida, LLC - Opa-Locka	Secondary Smelting / Refining
12	Derby Building Products, LLC	Plastics Pipe & Pipe Fitting
9	CSX Transportation - Hialeah	Rail Yard
7	Hometown Foods USA, LLC	Bakery
6	Kingspan Insulation, LLC	Plastics Product Manufacturing
5	Noven Pharmaceuticals, Inc.	Pharmaceutical Preparation Manufacturing
2	Solo Printing, LLC	Printing
2	Sunlite Sales, Inc.	Metal Coating / Engraving
1	Delta Apparel, Inc.	Printing
0	Heico Corporation	Aerospace Product and Parts Manufacturing
0	Hydro Conduit, LLC (DBA Rinker Materials)	Concrete Block and Brick Manufacturing
0	Asahi Refining Florida, Inc. - Miami Gardens	Secondary Smelting / Refining

<b>Carbon Monoxide (lbs)</b>		
3,521,121	Miami International Airport	Airport
2,012,665	Titan Florida LLC	Waste burning cement kiln
1,699,948	<b>Covanta Dade 2,592 ton/day Trash Incinerator [closed]</b>	Incinerator
990,800	Kendall-Tamiami Executive Airport	Airport
782,623	Opa Locka Executive Airport	Airport
641,255	Homestead Air Reserve Base - Airport	Airport
633,056	Cemex Construction Materials FL. LLC.	Cement kiln
428,536	Homestead General Aviation	Airport
395,782	WM - Medley Landfill	Landfill
286,767	<b>Proposed 4,000 ton/day Trash Incinerator</b>	Incinerator
177,362	Miami-Dade County - South Dade Landfill	Landfill
148,641	Miami-Dade Water and Sewer Department - 6800 SW 87th Ave	Sewage Treatment Plant
136,086	Miami-Dade County - North Dade Landfill	Landfill
57,641	NUSFC, LLC	Iron Foundry
56,801	Miami-Dade Water and Sewer Department - 8932 SW 232nd St	Sewage Treatment Plant
52,756	Turkey Point Power Plant (Florida Power & Light)	1,224 MW gas fired power plant
47,674	Miami-Dade Water and Sewer Department - 2575 NE 156th St	Sewage Treatment Plant
46,732	Miami-Dade Water and Sewer Department - 3869 Rickenbacker Causeway	Sewage Treatment Plant
27,991	Community Asphalt Corporation	Asphalt Plant
18,516	Miami-Dade Water and Sewer Department - 1100 W 2nd Ave	Water Supply and Irrigation Systems
6,708	Miami	Airport
4,473	Jackson Memorial Hospital	Hospital
4,129	Homestead Air Reserve Base	Military Base
3,366	Flowers Baking Company of Miami, LLC.	Bakery
2,750	58th St Landfill (Main County LF)	Landfill
2,607	CSX Transportation - Hialeah	Rail Yard
1,679	Derby Building Products, LLC	Plastics Pipe & Pipe Fitting
822	Kingspan Insulation, LLC	Plastics Product Manufacturing
659	Noven Pharmaceuticals, Inc.	Pharmaceutical Preparation Manufacturing
591	South Florida Water Management District	Administration of Water Resources
480	Homestead City Utilities	Oil-burning Power Plant
260	Hometown Foods USA, LLC	Bakery
235	Sunlite Sales, Inc.	Metal Coating / Engraving
177	Delta Apparel, Inc.	Printing
150	Solo Printing, LLC	Printing
96	Goodrich Corporation	Aerospace Product and Parts Manufacturing
80	Bill Ussery Motors Body Shop, Inc	Auto Body / Paint Shop
79	Aircraft Electric Motors, Inc.	Motor and Generator Manufacturing
52	AAR Landing Gear Services	Aerospace Product and Parts Manufacturing
52	Asahi Refining Florida, LLC - Opa-Locka	Secondary Smelting / Refining

50	Heico Corporation	Aerospace Product and Parts Manufacturing
38	Hydro Conduit, LLC (DBA Rinker Materials)	Concrete Block and Brick Manufacturing
20	U.S. Dept of Agriculture	Government agency
10	Asahi Refining Florida, Inc. - Miami Gardens	Secondary Smelting / Refining
2	Aerothrust Holdings, LLC	Aircraft Manufacturing

<b>Particulate Matter (lbs)</b>		
300,376	Turkey Point Power Plant (Florida Power & Light)	1,224 MW gas fired power plant
299,801	Miami-Dade Water and Sewer Department - 6800 SW 87th Ave	Sewage Treatment Plant
202,644	Cemex Construction Materials FL. LLC.	Cement kiln
117,838	Titan Florida LLC	Waste burning cement kiln
98,829	<b>Covanta Dade 2,592 ton/day Trash Incinerator [closed]</b>	Incinerator
52,397	WM - Medley Landfill	Landfill
51,793	NUSFC, LLC	Iron Foundry
44,138	<b>Proposed 4,000 ton/day Trash Incinerator</b>	Incinerator
37,767	Miami International Airport	Airport
34,409	Homestead Air Reserve Base - Airport	Airport
23,095	Opa Locka Executive Airport	Airport
21,992	Kendall-Tamiami Executive Airport	Airport
19,511	Cemex Construction Materials Florida LLC.	Concrete Batch Plant
18,253	South Florida Water Management District	Administration of Water Resources
14,578	Hydro Conduit, LLC (DBA Rinker Materials)	Concrete Block and Brick Manufacturing
10,311	Homestead General Aviation	Airport
10,152	Miami-Dade Water and Sewer Department - 8932 SW 232nd St	Sewage Treatment Plant
7,389	Miami-Dade County - South Dade Landfill	Landfill
7,032	FPT Florida LLC	Recyclable Material Merchant Wholesalers
5,670	Miami-Dade County - North Dade Landfill	Landfill
5,190	Miami-Dade Water and Sewer Department - 1100 W 2nd Ave	Water Supply and Irrigation Systems
4,727	Solo Printing, LLC	Printing
3,671	Miami-Dade Water and Sewer Department - 2575 NE 156th St	Sewage Treatment Plant
3,544	Miami-Dade Water and Sewer Department - 3869 Rickenbacker Causeway	Sewage Treatment Plant
3,182	Quikrete Companies, LLC	Concrete Product Manufacturing
1,739	Central Concrete Supermix, Inc.	Concrete Batch Plant
1,634	Derby Building Products, LLC	Plastics Pipe & Pipe Fitting
1,112	Trademark Metals Recycling LLC	Recyclable Material Merchant Wholesalers
914	Jackson Memorial Hospital	Hospital
719	Community Asphalt Corporation	Asphalt Plant
636	Kingspan Insulation, LLC	Plastics Product Manufacturing
630	Flowers Baking Company of Miami, LLC.	Bakery
620	Homestead Air Reserve Base	Military Base
588	Miami	Airport

558	U.S. Dept of Agriculture	Government agency
491	CSX Transportation - Hialeah	Rail Yard
489	Hector & Hector, Inc.	Institutional Furniture Manufacturing
483	Artco Group, Inc.	Wood Kitchen Cabinet and Countertop Manufacturing
226	Goodrich Corporation	Aerospace Product and Parts Manufacturing
224	Homestead City Utilities	Oil-burning Power Plant
170	Noven Pharmaceuticals, Inc.	Pharmaceutical Preparation Manufacturing
147	Hometown Foods USA, LLC	Bakery
86	Packaging Corporation of America	Corrugated and Solid Fiber Box Manufacturing
40	Delta Apparel, Inc.	Printing
33	Viking Kabinets, Inc.	Nonupholstered Wood Household Furniture Manufacturing
14	Sunlite Sales, Inc.	Metal Coating / Engraving
7	AAR Landing Gear Services	Aerospace Product and Parts Manufacturing
7	Heico Corporation	Aerospace Product and Parts Manufacturing
3	Asahi Refining Florida, Inc. - Miami Gardens	Secondary Smelting / Refining